Public Health England

Protecting and improving the nation's health

Chronic kidney disease prevalence model

October 2014

Introduction

- There is a wide spectrum of kidney disease, which can be rapid onset (acute) or longer term (chronic). CKD is closely related to cardiovascular disease (CVD) and the two processes often co-exist. People with CKD are at a high risk of mortality from CVD.

- CKD describes abnormal kidney function and/or structure. It is divided into five stages which increase in severity. Stages 3 to 5 are classified as moderate to severe CKD and stage 5 may require renal replacement therapy (RRT). It is common, frequently unrecognised and often exists together with other conditions, for example, CVD and diabetes.

- More information on CKD can be found in the kidney disease key facts: http://www.yhpho.org.uk/default.aspx?RID=185796

Background

- The chronic kidney disease (CKD) prevalence model was published in October 2014 by the National Cardiovascular Intelligence Network (www.ncvin.org.uk). The model provides estimates of total CKD prevalence for adults aged 16 and over in England.

- The model estimates the expected prevalence of CKD stage 3-5, defined as moderate–severe CKD with an estimated glomerular filtration rate (GFR) < 60ml/min/1.73m^2. The Modification of Diet in Renal Disease (MDRD) equation was used to estimate GFR.

- The model was developed using data from the 2009-2010 Health Survey for England and the 2011 Census. The estimates have been adjusted for age, sex, ethnicity and household tenure.

- CKD stage 3-5 estimates have been produced at local authority lower level, local authority upper level, clinical commissioning groups (CCG), region and the whole of England.

- The model was developed at the University of Southampton.

Previous CKD models

- The New Opportunities for Renal Intervention by Computerised Assessment (NEOERICA) has been used as the basis for a CKD model in 2005. Individuals with CKD were identified using GP practice data from Kent and Salford. CKD prevalence was calculated by applying the estimated CKD prevalence by age grouping to the ONS 2007 population estimates. These estimates however only take into account GP diagnosed CKD and the areas selected were not fully representative of the English population.

- In 2011 East Midlands Public Health Observatory (EMPHO) and NHS Kidney Care produced an online toolkit. Expected CKD prevalence was calculated using the combined results of the HSE 2009 and 2010. These estimates only adjusted for age and sex and do not take into account other factors that may affect CKD prevalence such as deprivation and ethnicity.
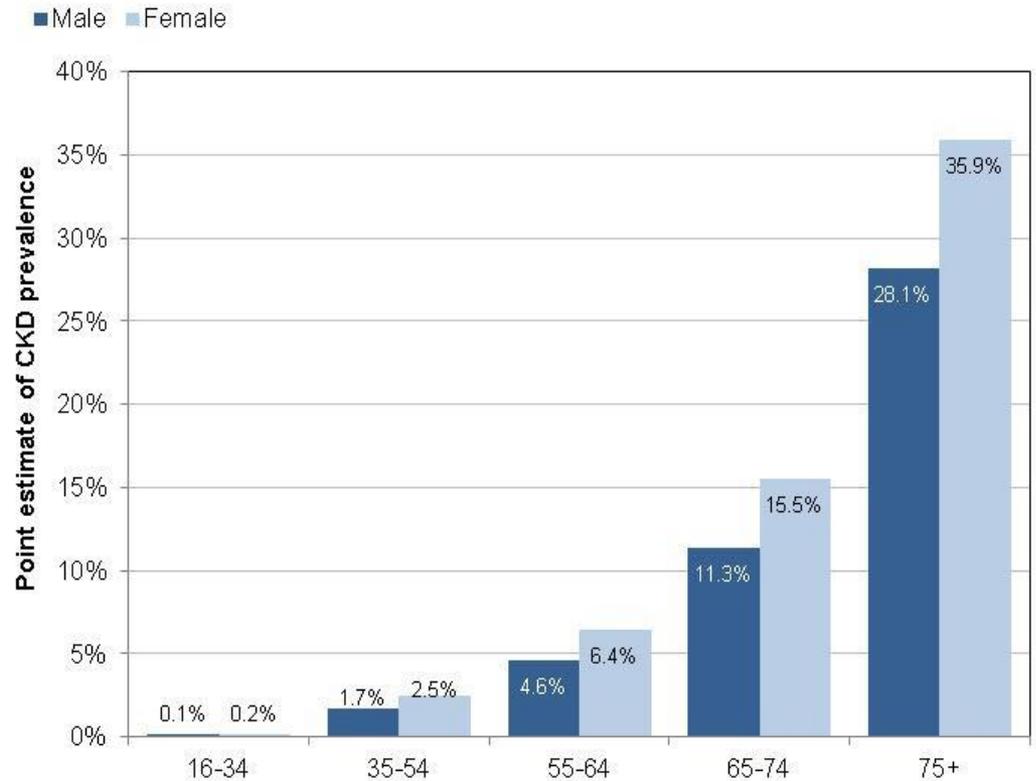
Current prevalence of CKD in England

- The new CKD prevalence model, estimated that in 2011 there were 2.6 million people (95% CI 2.3 million – 3.0 million) aged 16 years and older living with CKD stage 3-5 (diagnosed and undiagnosed).

- This is equal to 6.1% (95% CI 5.3% - 7.0%) of the population of this age group.

CKD prevalence by age and sex

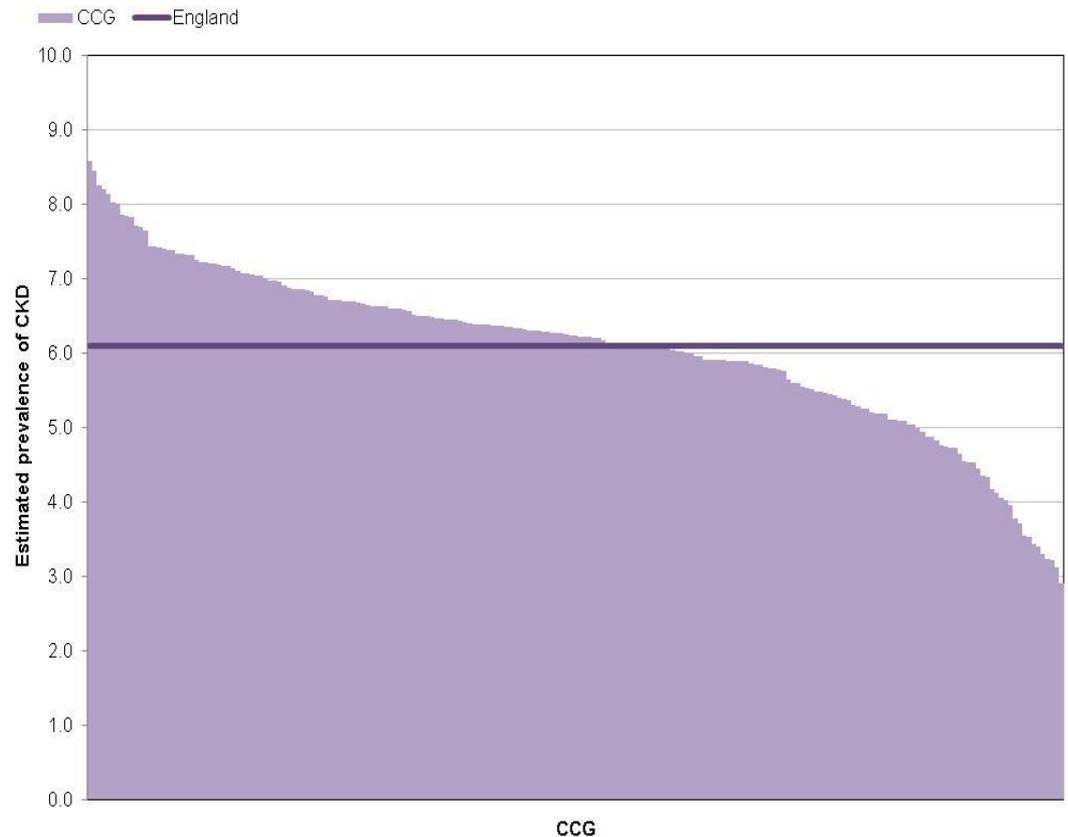Summary of estimated CKD stage 3-5 prevalence in England

- CKD stage 3-5 prevalence is higher in women than in men, 7.4% versus 4.7%

- There is a clear association between increasing age and higher CKD prevalence; with 1.9% of people aged 64 and under having CKD stage 3-5, 13.5% of people aged 65-74 and 32.7% of people aged 75 and over.

Chart legend: ■ Male ■ Female

Y-axis: Point estimate of CKD prevalence

Age group	Male	Female
16-34	0.1%	0.2%
35-54	1.7%	2.5%
55-64	4.6%	6.4%
65-74	11.3%	15.5%
75+	28.1%	35.9%

CKD prevalence by CCG
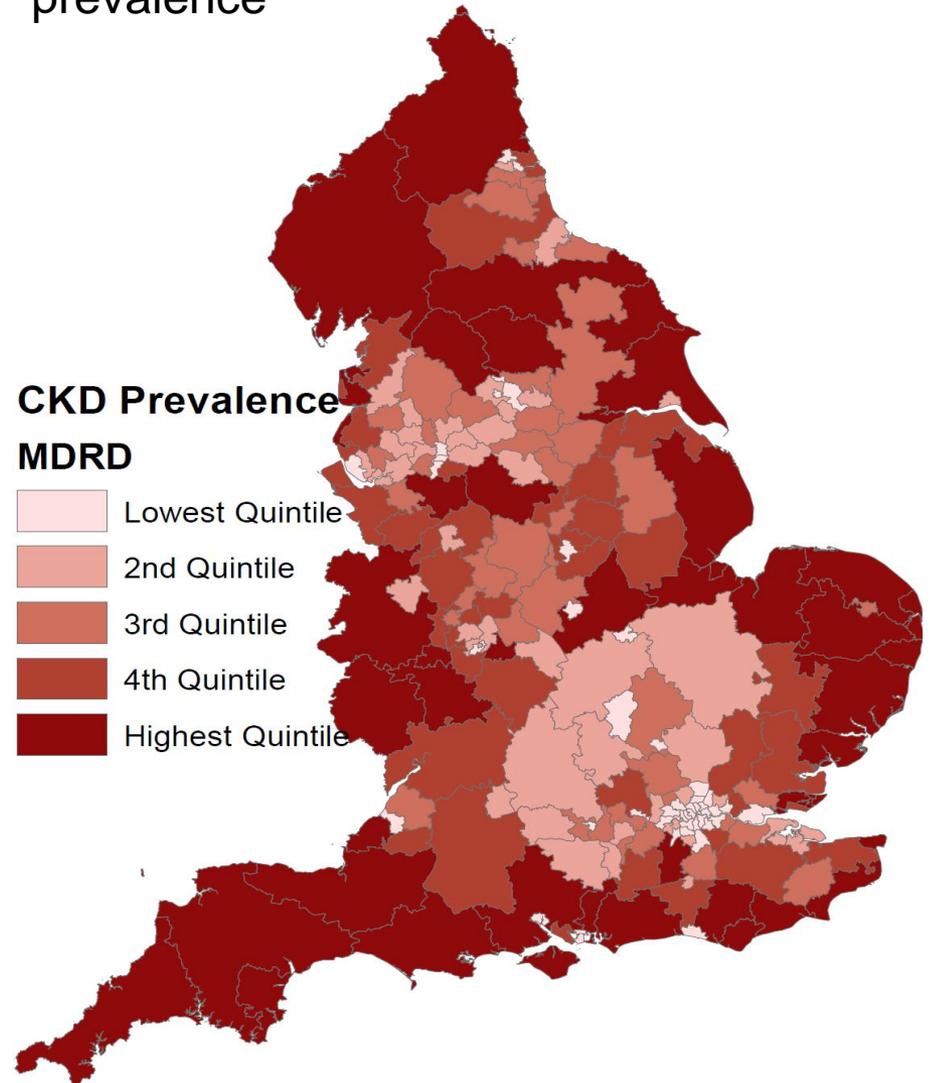
Estimated CKD stage 3-5 prevalence by CCG

- At CCG level, CKD stage 3-5 prevalence ranges from 2.9% to 8.6%

- At region level, CKD stage 3-5 prevalence ranges from 4.6% to 6.9%

CKD prevalence by CCG

Map of estimated CKD stage 3-5 prevalence

- The quintiles of CKD stage 3-5 prevalence are shown in the following map, with the highest quintiles mainly situated in the north and along the southern coastal and eastern coastal regions, and lowest quintiles in London.

- The expected prevalence largely reflects the age structure of the population, with CKD stage 3-5 highest in CCGs that have a high percentage of elderly people.

CKD Prevalence MDRD

- Lowest Quintile
- 2nd Quintile
- 3rd Quintile
- 4th Quintile
- Highest Quintile

CKD prevalence by CCG

CCGs with the highest expected total CKD stage 3-5

CCG Name	Number of people with CKD	% people with CKD	Lower CI	Upper CI
North Norfolk	12,301	8.6	5.9	11.3
Eastbourne, Hailsham & Seaford	12,825	8.5	4.7	12.2
Fylde & Wyre	11,276	8.3	5.8	10.7
Southport and Formby	7,819	8.2	4.6	11.9
Coastal West Sussex	32,042	8.1	4.7	11.6
South Devon and Torbay	17,661	8.0	5.0	10.2
Isle of Wight	9,260	8.0	5.0	11.1
Hastings & Rother	11,782	7.9	3.1	12.4
West Norfolk	11,121	7.9	4.3	11.5
Lincolnshire East	15,343	7.8	5.5	10.3

CCGs with the lowest expected total CKD stage 3-5

| CCG Name	Number of people with CKD	% people with CKD	Lower CI	Upper CI
Tower Hamlets	5,924	2.9	1.6	4.2
City and Hackney	6,301	3.1	1.9	4.3
Lambeth	7,989	3.2	2.0	4.3
Central Manchester	5,247	3.2	0.6	6.0
Southwark	7,765	3.3	1.8	4.7
Islington	5,895	3.4	2.5	4.1
Newham	8,164	3.4	2.3	4.6
Hammersmith and Fulham	5,402	3.5	2.4	4.4
Wandsworth	9,075	3.5	2.2	4.8
Haringey	7,520	3.7	2.5	4.8

Comparisons with QOF

- There were 1.9 million people aged 18 years and older included on CKD registers in the Quality and Outcomes Framework (QOF) in 2011/12. This is equal to 4.3% of the population of this age group.

- Comparisons between the modelled estimates and the 2011/12 QOF suggest that 71% of adults who have CKD stage 3-5 are included on CKD registers.

- It is therefore estimated that there are approximately 750,000 adults with CKD who have not been diagnosed and registered.

Comparisons with QOF

Ratio of modelled CKD estimates against 2011/12 QOF

- The ratio of the estimated prevalence divided by the observed prevalence (QOF) was calculated.

Ratio MDRD over QOF

	Less than 1
	1 to 1.2
	1.2 to 1.4
	1.4 to 1.6
	1.6 to 1.8
	Greater than 1.8
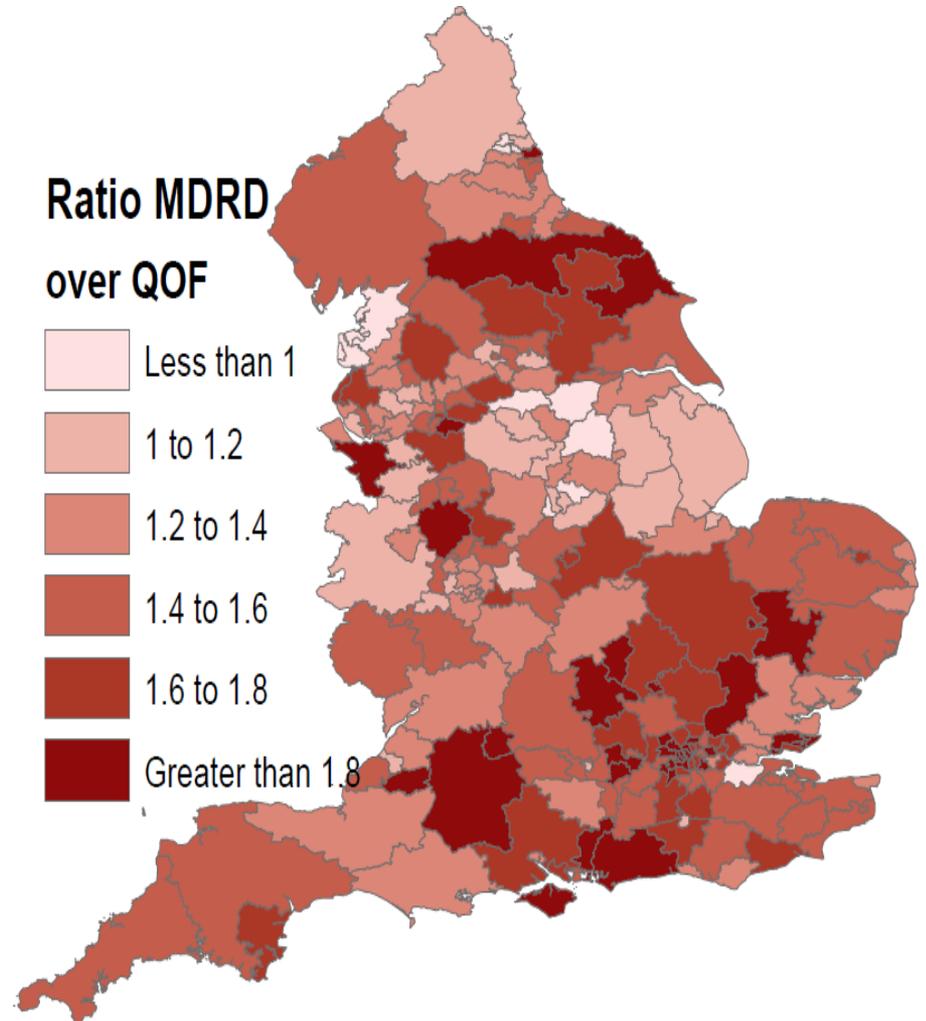
Comparisons with QOF

CCGs with a high ratio of modelled estimates against QOF (>1.8)

- CCGs with the greatest disparity between the modelled estimates and the QOF estimates

- A large number are located in the London area, despite having some of the lowest expected CKD stage 3-5 prevalence
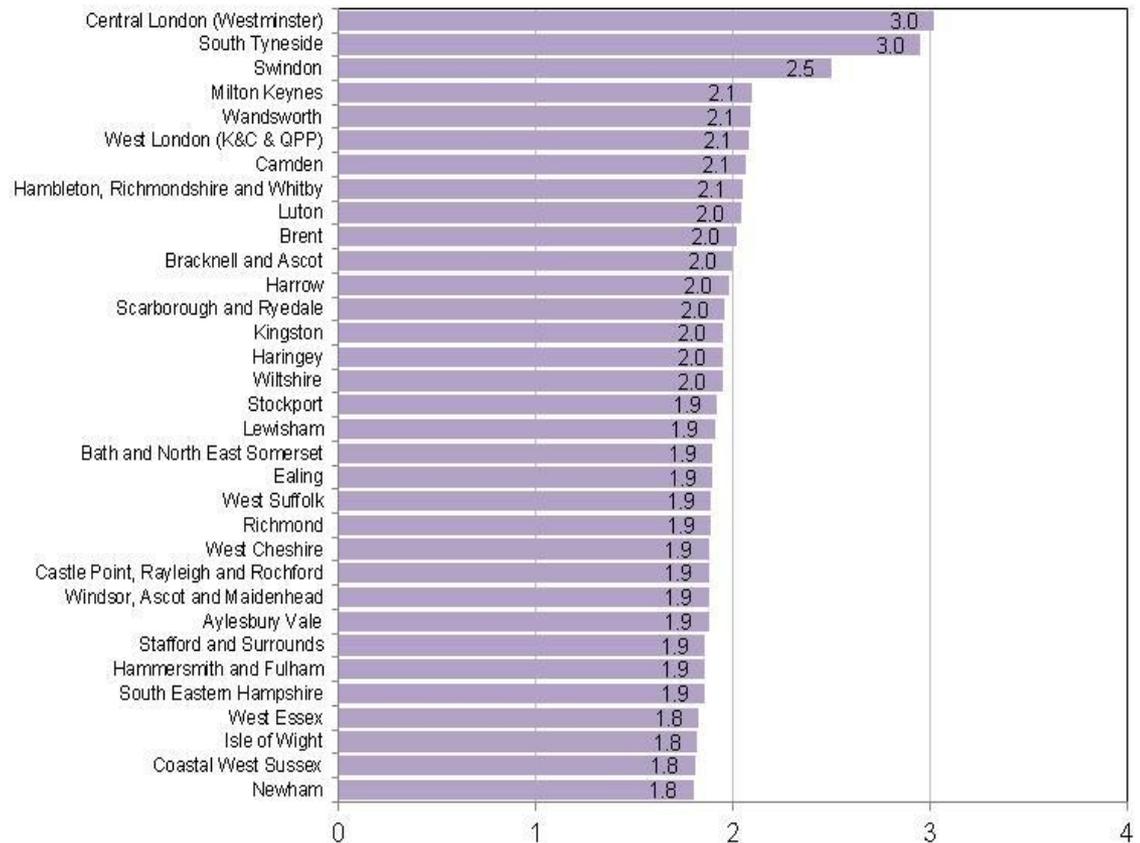
Future prevalence of CKD

Projections of growth in expected number of people in England with CKD stage 3-5, 2011 – 2036

- Simple estimates of CKD prevalence have been calculated up to 2036. These estimates are based on the projected population increase and assume no change in the age – specific prevalence of CKD stage 3-5 and no improvement in the prevention and management of CKD stage 3-5.

- Between 2011 and 2036 the prevalence of CKD stage 3-5 among people aged 16 years and over is expected to increase to 4.2 million or 8.3%.
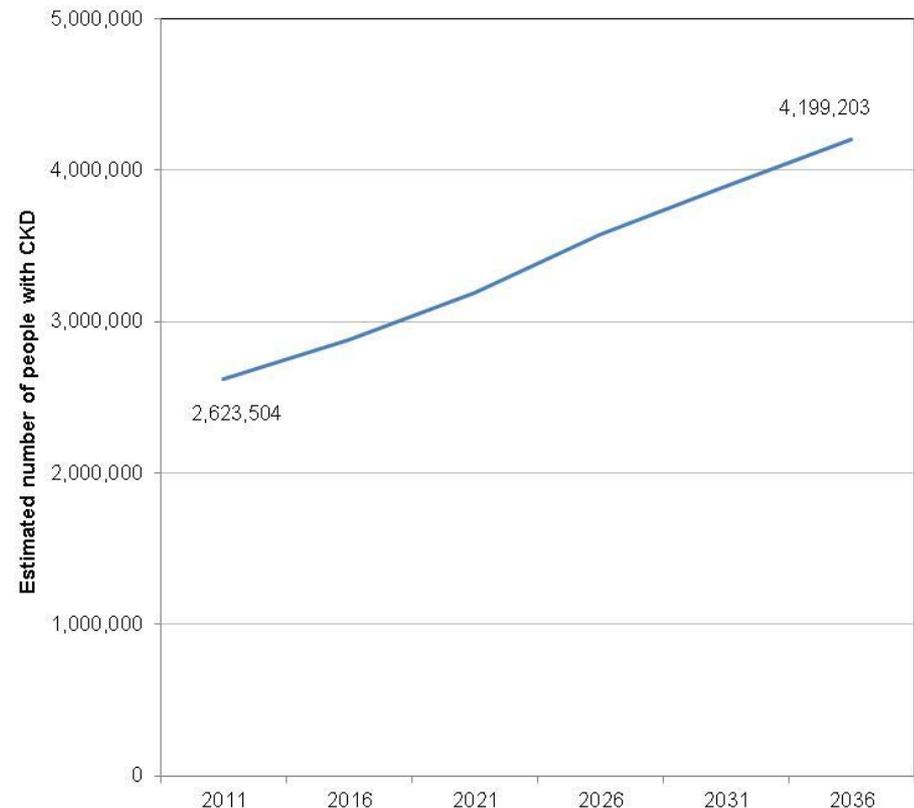
Future prevalence of CKD by CCG

CCGs with the highest expected increase in prevalence (%)

- Prevalence of CKD stage 3-5 is not expected to increase uniformly across England with some CCGs expected to see the prevalence of CKD increase by over 50% between 2011 and 2036 due to significant increases in age.
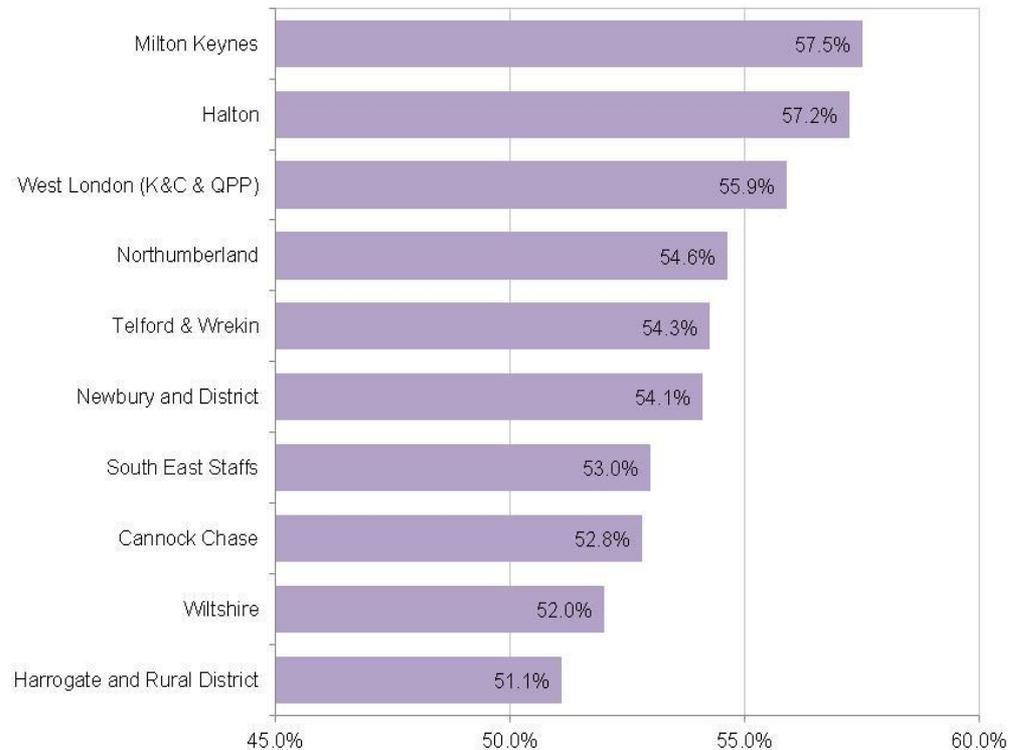
Further information

- The estimates and details of the model methodology are available from the National cardiovascular intelligence network (NCVIN) website www.ncvin.org.uk

- NCVIN analyses information and data and turns it into meaningful timely health intelligence for commissioners, policy makers, clinicians and health professionals to improve services and outcomes.

- Please send your feedback about NCVIN to ncvin@phe.gov.uk

Data sources

- The CKD model was developed by: Grant Aitken (PhD Researcher, Geography and Environment, University of Southampton) supervised by Graham Moon (Professor in Spatial Analysis, Geography and Environment, University of Southampton) and Paul Roderick (Professor in Public Health, Primary Care and Population Sciences, University of Southampton).

- Office for National Statistics, 2012-based Subnational Population Projections for England

- Quality and Outcomes Framework (QOF), 2011/12, Copyright © 2014, Re-used with the permission of the Health and Social Care Information Centre. All rights reserved.